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NEWSLETTER

Indiana State Department of Health

Epidemiology Resource Center
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Outbreak Summary 2001: A Mixed Bag of Bugs

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The main objective of any communicable disease outbreak investigation is to identify the infectious agent and the causative factors in order to control the outbreak and prevent further disease transmission. Thorough investigations can also monitor emerging trends and provide a knowledge base to prevent similar occurrences in the future. Therefore, outbreaks or clusters of unusual disease incidence are reportable to the Indiana State Department of Health (ISDH) [IAC 410 1-2.3]. Outbreak investigations should be a collaborative effort between the local health departments and ISDH. It is the local health department's responsibility to notify ISDH of the outbreak and to perform the majority of investigative procedures, while the ISDH role is mainly coordination and consultation. In large or complex outbreak situations, the ISDH may provide direct or on-site assistance.

This narrative describes only those outbreak investigations in which the ISDH Communicable Disease Program (CDP) participated. The ISDH Communicable Disease Program investigated a total of 16 outbreaks in 2001 (Table 1), a 50% decrease compared to 2000. Whether this is due to a true decline in the number of outbreaks or to underreporting is unclear.

Four of the reported outbreaks were respiratory, and twelve were gastrointestinal. In addition, one small cluster of meningococcal cases was reported in northeastern Indiana. Of the gastrointestinal outbreaks, four were foodborne, five were spread by person-to-person contact, and three outbreaks did not have a conclusive transmission route. No waterborne outbreaks were reported in 2001. The Food Protection Program and Long Term Care Program, in addition to lending valuable expertise and experience during outbreak investigations, also investigate a substantial number of food-related complaints and other clusters of illness for which the CDP never becomes involved.

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Respiratory

Two respiratory outbreaks occurred in long-term care facilities. At least thirty residents and staff at one state hospital developed respiratory illness characterized by cough, nasal congestion, chest congestion and low-grade fever between May 3 and June 1. Four cases of pneumonia were confirmed by x-ray. Three residents were hospitalized overnight, and one resident died. Cases were confined to one particular ward, and transmission appeared to have occurred person-to-person. No airborne contaminant was identified through environmental sampling. No viral agent was identified through culture or serology. However, polymerase chain reaction (PCR) testing was not available to identify common bacterial agents of community-acquired respiratory infection. Residents and staff were given prophylactic azithromycin beginning May 25. Most residents and staff showed marked improvement after receiving prophylaxis, and the number of cases greatly decreased following prophylaxis.

At least 15 residents and staff at a private long-term care facility became ill with respiratory illness characterized by nasal congestion, cough, chest congestion and low-grade fever from July 5 to July 26. One case of pneumonia was confirmed by x-ray. No cases were hospitalized. Cases were confined to one particular ward, and transmission appeared to have occurred person-to-person. No viral agent was identified through culture or serology. Polymerase chain reaction (PCR) testing was not available to identify common bacterial agents of community-acquired respiratory infection. Symptoms were more consistent with viral infection; however, some residents reported lessening of symptoms after receiving antibiotics.

On October 30, the Hamilton County Health Department reported a large outbreak of respiratory illness among school children in the county. As of this writing, 149 cases, primarily among school children and their contacts, have been interviewed, with onsets ranging from August 1, 2001 to January 23, 2002. Transmission occurred person-to-person. Predominant symptoms include pneumonia, cough, chest congestion, body aches, fever (median 102.5°F), and chills. Ten of the cases have been confirmed positive by laboratory testing for *Mycoplasma pneumoniae*. In addition, fifteen cases of pertussis were identified during this outbreak, with onset dates occurring from October 15 to December 8. Five cases occurred among students at one high school, four others in a junior high, and three cases in one elementary school. One of the adult cases worked at the same elementary school as the three cases. Although direct links could not be found among all pertussis cases, some transmission is thought to have occurred in the school community and family settings. The investigation of this respiratory outbreak is still ongoing.

On December 14, the Shelby County Health Department reported a large outbreak of respiratory illness among students at Shelbyville High School. Preliminary lab testing revealed the cause of this outbreak as histoplasmosis. An investigative team from the Centers for Disease Control and Prevention (CDC) was invited by the Shelby County health officer to participate in the investigation, which included an environmental assessment and collection of blood specimens from students for laboratory testing at CDC. At this writing, testing has confirmed the causative agent as *Histoplasma capsulatum*, however, the exact number of cases is not known. The source of infection is suspected to be school air-intake ducts contaminated with spore-laden soil. Overgrown shrubs, which have been used extensively as bird roosts, were located adjacent to the ducts. These were removed in late October. On November 12, the soil under nearby trees had been turned with a rototiller, possibly creating an aerosol of spores. The first case among students appeared to occur the last week of November. The investigation into this outbreak continues.

Meningococcal Cluster

One probable case and three confirmed cases of meningococcal disease were reported in residents of Noble County. Diagnosis in a clinically compatible case is confirmed by isolating meningococci from a normally sterile site (e.g., cerebrospinal fluid (CSF), blood, synovial fluid, pleural fluid or pericardial fluid). A probable diagnosis may be made in the absence of a positive culture if clinical purpura fulminans is present or when both clinically compatible symptoms and a positive CSF antigen test are present.

The first case was a young child who attended preschool. Onset was June 9. The child was hospitalized and survived. The ISDH Laboratory identified the agent as *Neisseria meningitidis,* serogroup B. The other cases were reported during a three-week period beginning November 11, 2001. The following table describes these cases:

Onset Date	Age Group	Daycare Association	Case Status	Serogroup	Outcome
11/11/01	Child	Yes	Probable	N/A	Survived
11/29/01	Young Adult	No	Confirmed	B	Survived
12/2/01	Young Adult	No	Confirmed	B	Survived

The Centers for Disease Control and Prevention (CDC) was notified of the cluster. The probable case received several doses of antibiotics prior to collection of CSF. The CSF specimen was sent to CDC for further testing but the organism was not identified. The case with onset on 11/29/01 did not have the organism identified by the hospital laboratory. Serum was sent to CDC, and *N. meningitidis,* serogroup B was identified by the PCR. There was no isolate available for comparison with the other serogroup B cases identified. Isolates from the 6/9/01 and 12/2/01 cases were compared using pulse-field gel electrophoresis, and the isolates were only 55% similar. A public health investigation failed to determine an epidemiological association between any of these four cases. Close contacts received prophylactic antibiotics.

Foodborne/Gastrointestinal

Eight confirmed and four suspected outbreaks of Norwalk-like virus occurred in Indiana in 2001 (see table). Settings included long-term care facilities, restaurants/caterers, daycare centers, and homes. Four of the outbreaks were foodborne, five were attributed to person-to-person contact, and three did not have a conclusive route of transmission. Foodborne viral outbreaks usually occur when an infected person handles raw foods (salads, vegetables, etc.) or ready-to-eat foods (sliced luncheon meats, rolls, etc.) without thoroughly washing hands after using the restroom. Due to the extremely infectious nature of viral agents, they can also easily be transmitted from person to person via contaminated hands or surfaces. In most cases, there was a background of illness in food handlers or contact with others ill prior to the outbreak.

One outbreak of shigellosis occurred in Boone County. Throughout November and December, 24 cases were confirmed positive for *Shigella sonnei.* Sixteen of the cases attended the same daycare, eight attended a local elementary school, three attended a preschool, one attended a local high school, and two cases were at-home contacts. Transmission occurred person-to-person. Infection may have been introduced through an ill child who attended the daycare. Several daycare children were ill with diarrhea weeks before the outbreak, but were not diagnosed or treated. Once introduced into a vulnerable population, shigellosis can be difficult to control even with the most stringent measures, due to its highly infectious nature.

Based on experiences in disease investigation, the ISDH makes the following recommendations to local health departments for efficient and scientifically sound disease investigations:

- ***Ensure that everyone involved in the process is working together***. This may involve initial and even daily meetings among environmental and nursing staffs.
- ***Maintain supplies for outbreak investigations***. Inventory supplies to make sure you are equipped to investigate outbreaks. **Containers for collecting stool samples specific for bacterial and viral pathogens (7A) should be readily available. Be sure to check the expiration dates on the containers.** New containers can be ordered or expired ones replaced by calling the ISDH Containers Section at (317) 233-8104. Call (317) 233-7009 for information regarding specimen collection for respiratory outbreaks.
- ***If an outbreak is suspected, contact ISDH as soon as possible***. Gather basic information about the outbreak beforehand. For foodborne outbreaks, this information includes:

  - Type of event, location, date, number of meal(s) served and time of meal(s)
  - Source of food served (caterer, home, etc.) and contact person for the source
  - Number of exposed persons
  - Number of known ill persons
  - Range and times of illness onset
  - Main symptoms
  - Contact person for ill persons and phone number, if possible
  - Menu of all food and beverage items served
  - Availability of clinical and food samples

  For respiratory outbreaks, obtain the following information:

  - Location of outbreak
  - Number of known ill persons
  - Range and times of illness onset
  - Main symptoms
  - Contact person for ill persons and phone number, if possible
  - Any laboratory results already obtained by private physicians
  - Availability of clinical samples (i.e., are people still becoming ill)

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Important Telephone Numbers

To report suspected unusual incidence of disease or condition:
Indiana State Department of Health
Communicable Disease Program
317-233-7125 or 800-382-9480 and ask for Communicable Disease
8:15-4:45 EST

Routine infectious disease reports:
Indiana State Department of Health
Communicable Disease Program
317-233-7125 or 800-382-9480 and ask for Communicable Disease
8:15-4:45 EST

To speak with an epidemiologist:
Indiana State Department of Health
Communicable Disease Program
317-233-7125 or 800-382-9480 and ask for Communicable Disease
8:15-4:45 EST

Information about laboratory testing:
Indiana State Department of Health
Laboratories
Clinical testing information
Virology/Immunology (Chlamydia & Gonorrhea)/HIV/Molecular Biology/Syphilis/Rabies: 317-233-8050
Clinical Microbiology: 317-233-8036
Containers: 317-233-8104 or 317-233-8105
Environmental testing information: 317-233-8077
Food sample testing: 317-233-7337
8:15-4:45 EST

After Hours Emergencies:
Indiana State Department of Health
Communicable Disease Program
317-233-1325
The answering service will notify the on-call epidemiologist who will return your call.

SUMMARY OF DISEASE OUTBREAKS INVESTIGATED BY ISDH COMMUNICABLE DISEASE DIVISION

INDIANA, 2001

Month	County	Site	Description	Organism[1]	Most probable source	Local Participation	Comments[2]
January	Johnson	Long-term Care facility	Gastroenteritis 61 cases	Norwalk-like virus	Unknown	Johnson CHD	4 cases confirmed
February	Tippecanoe	State facility	Gastroenteritis 85 cases	Norwalk-like virus	Community	Tippecanoe CHD Indiana Veteran's Home	12 cases confirmed
March	Marshall	Restaurant	Gastroenteritis 25 cases	Unknown	Unknown	Marshall CHD	Probably viral
March	Hancock	Long-term Care facility	Gastroenteritis 109 cases	Norwalk-like virus	Unknown	Hancock CHD	4 cases confirmed
March	Dubois	Long-term Care facility	Gastroenteritis 31 cases	Unknown	Unknown	Dubois CHD	Probably viral
April	Allen	Daycare	Gastroenteritis 30 cases	Norwalk-like virus	Community	Allen CHD	5 cases confirmed
May	Wayne	State facility	Lower resp. infection 30 cases	Unknown	Infected staff member	Wayne CHD Richmond State Hospital	Probably bacterial
June	Allen	Mobile home park	Gastroenteritis 16	Norwalk-like virus	Unknown	Allen	4 cases confirmed
July	Bartholomew	Long-term Care facility	Respiratory infection 15 cases	Unknown	Community	Bartholomew CHD	Inconclusive
July	Marshall	Private park	Gastroenteritis 24 cases	Unknown	Unknown	Marshall CHD	Probably viral
August	Hamilton	Community	Lower resp. Infection 149 cases[3]	*Mycoplasma pneumoniae* *Bordetella pertussis*	Community	Hamilton CHD	10 mycoplasmal cases confirmed 1 pertussis case confirmed

Month	County	Site	Description	Organism[1]	Most probable source	Local Participation	Comments[2]
November	Boone	Daycare	Gastroenteritis 24 cases	*Shigella sonnei*	Infected child	Boone CHD	24 cases confirmed
November	Hamilton	Restaurant	Gastroenteritis 21 cases	Norwalk-like virus	Salad	Hamilton CHD	2 cases confirmed
November	Shelby	School	Respiratory infection Case count unknown[3]	*Histoplasma capsulatum*	Contaminated air-intake ducts	Shelby CHD	Unknown number of cases confirmed[3]
December	Tipton	Caterer	Gastroenteritis 18 cases	Unknown	Pea salad Broccoli salad	Tipton CHD	Probably viral
December	St. Joseph	Private residence	Gastroenteritis 12 cases	Norwalk-like virus	Raw broccoli	St. Joseph CHD	1 case confirmed

1. **Organisms culture-confirmed from stool samples, foods, other environmental sources, or determined by serologic testing.**
2. **Assessment of likely etiology based on incubation period, distribution of cases, and spectrum of symptoms shown.**
3. **Cases reported to ISDH as of February 6, 2002.**

Bioterrorism Preparedness:
Survey Results Will Help Guide Federal Funding

Leah Ingraham, Ph.D.
ISDH Epidemiology Resource Center

On January 31, 2001, Governor O'Bannon received notification of Indiana federal funding for Indiana from Tommy G. Thompson, Secretary of Health and Human Services. Eventually, Indiana will receive approximately $20 million to support state and local public health measures to strengthen Indiana's public health infrastructure, particularly the capability to respond to bioterrorism. Guidance for preparation of the initial proposal to secure these funds will be sent to State Health Commissioner, Gregory A. Wilson, M.D., by mid February. Fourteen "benchmarks" must be met by the state in qualifying for the funds. Key to the effective use of this resource will be the integration of the preparedness planning efforts already in place in the state, including the results from a survey designed jointly by the Department of Justice (DOJ) and the Centers for Disease Control and Prevention (CDC).

DOJ/CDC Survey

An important component of statewide bioterrorism preparedness is the role of local health departments (LHDs). An instrument designed by DOJ and CDC entitled *Performance Assessment – Public Health Emergency Preparedness* provides a comprehensive listing of the ten Essential Services of Public Health (Table 1) as they apply to the preparedness for response to bioterrorism. The Essential Services were developed in 1994 through the National Public Health Performance Standards Program (NPHPSP), and their application to terrorism highlights the dual purpose of public health services. Whether a disease outbreak naturally occurs or occurs through malicious intent, the role of public health remains the same: to monitor health status, investigate disease outbreaks, and to provide to the public helpful information and services designed to promote and protect the health of all citizens.

Table 1. Essential Services of Public Health

1. Monitor health status of the population
2. Diagnose and investigate infectious disease and environmental health problems
3. Inform, educate, and empower people about specific health issues
4. Mobilized community partnerships to identify and solve health problems
5. Develop policies and plans to support individual and community health
6. Enforce laws and regulations to protect health and ensure safety
7. Link people to needed personal health services
8. Assure a competent and trained public and personal health care workforce
9. Evaluate effectiveness, accessibility and quality of personal and population-based health services
10. Participate in research for new insights and innovative solution to health problems.

Value of the Survey

During February, LHDs will receive information about completing the survey. Because the survey is comprehensive in scope, it is valuable whether or not a LHD has previously engaged actively in bioterrorism preparedness planning. The survey items overview the local public health system, which encompasses not only the functions of the LHD staff but also the capability of other local health-related agencies and organizations to respond to disease outbreaks. Therefore, countywide input is necessary, including information from both local health care providers such as physicians and nurses, and local health care facilities such as hospitals, clinics, and clinical laboratories. Because effective response, particularly in the instance of an announced attack, will also engage official first responders, representatives from the local law enforcement, fire departments, emergency medical services, and emergency management agencies will also be important. Thus, completion of the survey encourages countywide networking and sharing of information.

The comprehensive nature of the survey is also an advantage for counties just beginning their planning efforts for bioterrorism. Regardless of the progress to date, the survey can be used as a checklist of activities that are necessary to have an effective county plan. In instances where a county may not have all of the assets described in the survey, the effort to identify gaps in capabilities can be the impetus for planning mutual aid agreements to share resources across jurisdictional lines.

A final advantage of the survey is that the data will aid ISDH in directing funds to help meet local needs. Many of Indiana's LHDs have small staffs and limited resources. Part of the intent of the federal funding is to help build the capability of LHDs to respond to public health emergencies in general as well as bioterrorist threats.

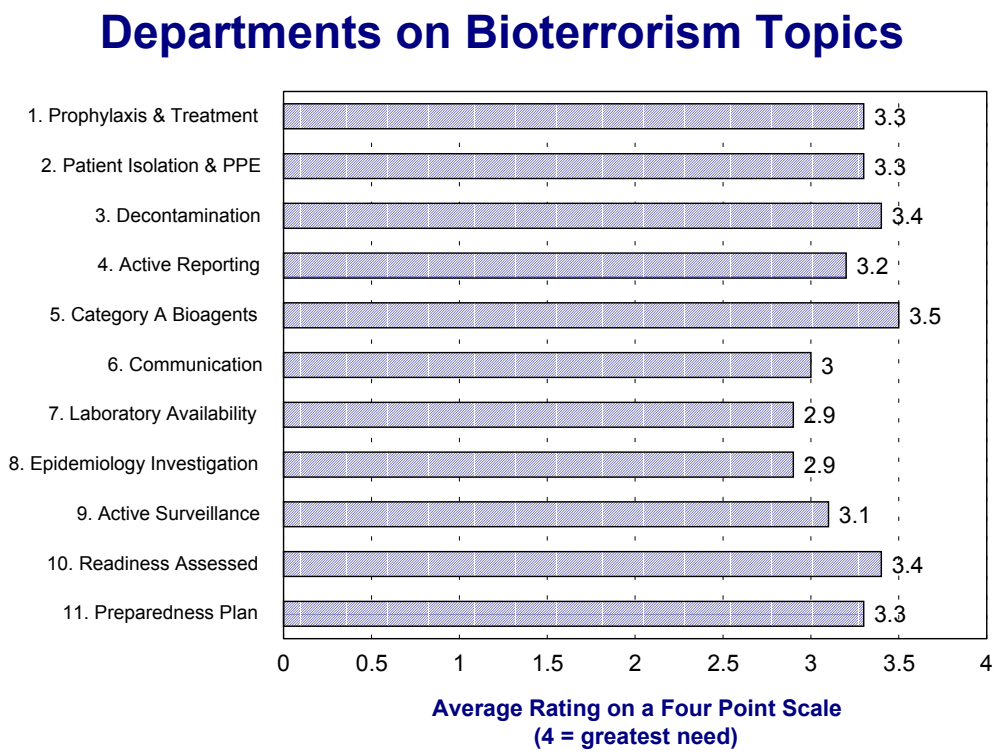
Technical Assistance from ISDH

Staff of LHDs will receive technical assistance from ISDH. Health Commissioner Wilson will be sending e-mail messages about the survey, how to access it, and the planned assistance. Leah Ingraham, Ph.D., an external consultant to the ISDH, will lead the effort to provide technical assistance. She will be offering trainings as well as providing helpful support materials, such as contact lists for county agencies including clinical labs, community health clinics, Red Cross chapters, and emergency management agencies.

Links to Other Planning and Preparedness Activities

In 1999, ISDH staff surveyed LHDs for their needs with respect to bioterrorism preparedness. The results showed a high need for training (Figure 1). ISDH staff responded to these needs by providing the *Interim Guide: Bioterrorism and Local Health Department Response* in July 2000. The Indiana University Department of Public Health presented a program in Disaster Preparedness in September 2000. More recently, the ISDH produced the satellite seminar *Public Health Emergency Response*, which aired on January 4, 2001. The seminar was attended by approximately 350 participants at 81 downlink sites. Evaluations of the seminar showed appreciation for the information. There were also many requests for printed materials that would provide helpful summaries of the presentations. Videos of the seminar are available at a cost of $25 each for the morning and afternoon sessions plus $5 for shipping and handling and may be ordered by phoning 1-877-252-1200. LHDs will also receive a CD of the seminar slides. Some summary materials will also be available through the technical assistance planned for the DOJ/CDC survey.

Figure 1.



Research Planning Incorporated (RPI), under contract to the State Emergency Management Agency (SEMA), recently conducted county level trainings to support planning for terrorism consequence management. Funded by a grant from the Federal Emergency Management Agency, the RPI/SEMA effort and was designed to help county official responders, medical, and public health professionals join together to develop consequence management plans based on the "Essential Support Functions" (ESF) model. These trainings are complimentary to the county level responses to the DOJ/CDC Survey. This survey is designed to identify capabilities and needs in the ESF devoted to health and medical services, an important part of a comprehensive response plan.

The three phases for the RPI/SEMA project are designed according to population ranges: Phase I counties with 35,000 to 100,000 population, Phase II > 100,000, and Phase III < 35,000. Eventually, all counties will have this support for their consequence management plans.

Future planning efforts for counties will be directed toward specific aspects of health and medical services through ISDH. LHDs will be responsible for plans to receive, secure, and distribute items from the National Pharmaceutical Stockpile should there be a need to mobilize it for the benefit of Indiana citizens. Likewise, LHDs will play key roles in the smallpox response plans for the state in the event that smallpox virus is released in a terrorist attack.

Conclusion

Completion of the DOJ/CDC survey of public health emergency preparedness will provide a foundation for LHDs. Through the data gathered for this survey, LHDs will have a detailed assessment of resources and capabilities within their jurisdictions. They will also have information about their needs for additional resources to assure effective and timely responses to major disease outbreaks or other threats to the health and well being of their constituents.

Smoking During Pregnancy in Indiana: 1989-2000

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Maternal smoking during pregnancy has been associated with low birth weight, fetal growth retardation, sudden infant death syndrome, and placental abruption[1-6]. Women who smoke during pregnancy are estimated to have twice the risk of having a low birth weight baby compared to those who do not smoke. The reduced birth weight is mainly due to intrauterine growth retardation and to a lesser extent to preterm birth[3,7,8]. Because of the high prevalence of prenatal smoking in Indiana, it must be considered as the most important preventable cause of fetal growth retardation. Despite the declining rate of smoking among pregnant women in Indiana during the last decade, Indiana remains to be one of the top four states in the nation for a high maternal smoking rate in 1999[9]. This study presents trends in smoking among pregnant women in Indiana over the last several years. Analyzing the smoking pattern according to mother's characteristics and at the county level will help us to better assess Indiana's performance in its effort to reduce prenatal smoking rate.

Smoking during pregnancy declined in Indiana and nationwide

During the 1990's, smoking during pregnancy in US decreased by 33 percent, from 18.4% in 1990 to 12.3% in 1999[9], whereas in Indiana, it declined by 22%, from 26.7% in 1990 to 20.9% in 1999 (Figure 1). In 1990, the smoking rate in Indiana was 45 percent higher than the national average, compared to a 70 percent higher rate in 1999. Therefore, despite a decline in smoking during pregnancy in Indiana in the 1990's, the gap between the rates in Indiana and in the U.S. has widened.

In the following sections, information on the smoking rate and intensity are provided for women with singleton live births. The results are almost identical to all live births. Results are based on data reported on the live birth certificates from 1989 to 2000 (provisional).

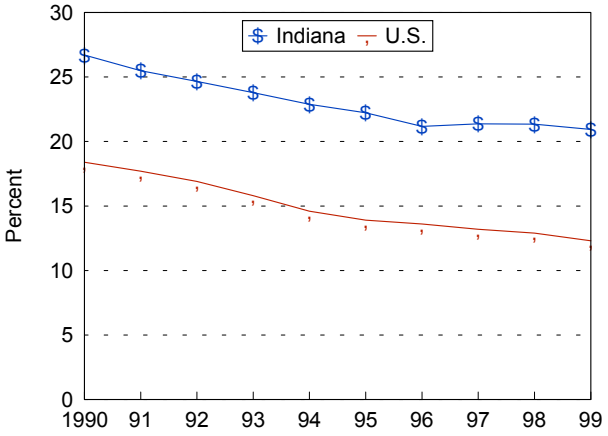


Figure 1. Prevalence of smoking during pregnancy: Indiana and U.S., 1990-1999 all live births

(US average excludes California, Indiana, New York, and South Dakota)

Smoking declined in both rate and intensity

From 1989 to 2000, the smoking rate during pregnancy among Indiana mothers decreased by 26 percent from 27.5% to 20.5%. The degree of decline in smoking rate during this period varied by the extent of smoking. Prevalence of smoking 20 or more cigarettes per day decreased by 42% between 1989 and 2000, whereas smoking 1-10 cigarettes per declined by 11% during this period. In 1989, 31% of all pregnant smokers in Indiana smoked 20 or more cigarettes per day compared to 24% in 2000 (Figure 2). Therefore, prenatal smoking in Indiana declined in rate as well as in intensity.

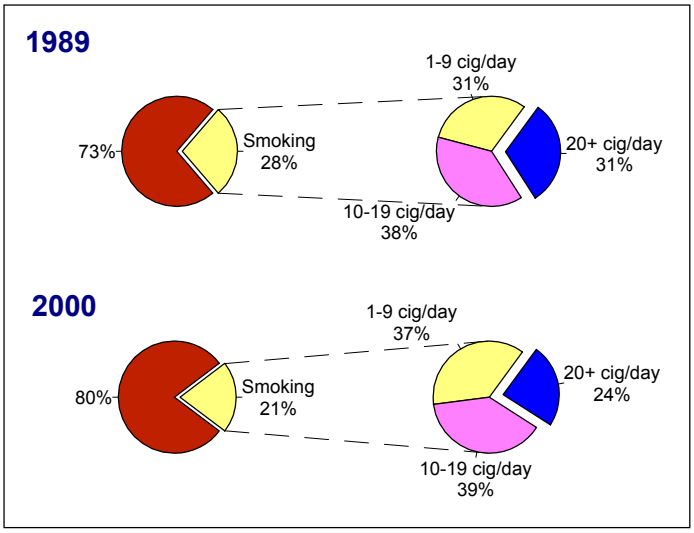


Figure 2. Proportion of smokers according to the number of cigarettes smoked: Indiana, 1989 and 2000 singleton live births

Smoking rate and intensity varied by race and Hispanic origin but declined among all

During 1989 to 2000, the smoking rate was highest among non-Hispanic whites followed by blacks and Hispanics (Figure 3). Throughout this period, Hispanics had the lowest rate and the sharpest decline (by 61%) in their smoking rate compared to the decline among blacks (by 36%) and non-Hispanic whites (by 21%). Since 1996, the downward trend in the smoking rate came to a halt for non-Hispanic whites, slowed down for blacks, but continued to decline for Hispanics.

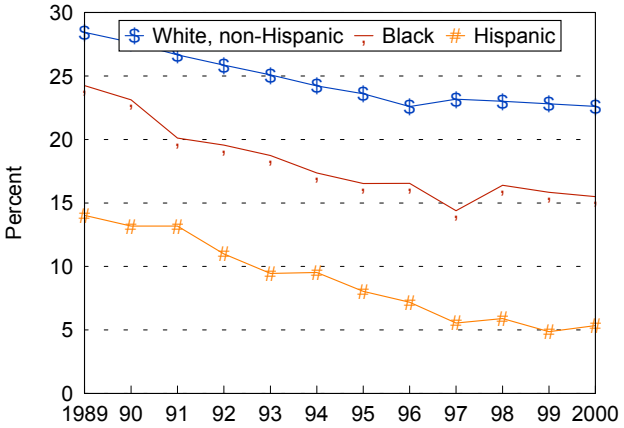


Figure 3. Prevalence of smoking during pregnancy by race/Hispanic origin of mother: Indiana, 1989-2000

Smoking intensity also varied by race/Hispanic origin. In year 2000, 26% of the non-Hispanic white smokers smoked 20 or more cigarettes per day compared to 12% of the black smokers and 15% of the Hispanic smokers (Figure 4). The majority of black and Hispanic smokers smoked less than 10 cigarettes per day (59-62%) compared to 34% of non-Hispanic white smokers. Therefore, non-Hispanic white mothers not only had a higher prevalence of smoking but were also heavier smokers compared to blacks and Hispanics.

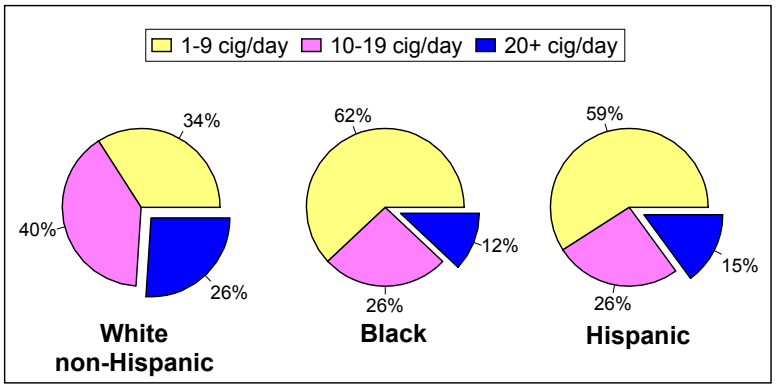


Figure 4. Proportion of smokers according to the number of cigarettes smoked by race/Hispanic origin of mother: Indiana, 2000 singleton live births

Smoking prevalence increased with age among blacks and decreased with age among non-Hispanic whites

Throughout 1989 to 2000, the prevalence of smoking among non-Hispanic whites was highest for teenage mothers (less than 20 years of age) compared to other age groups. In contrast, among black mothers, the smoking rate was lowest among teens and highest among those 35 years and older. During 1999-2000 period, the smoking rate of 37.2% among teen non-Hispanic white mothers was more than double the rate of 15.6% among women 35 years of age and older. In contrast, among blacks, the smoking rate of teens (11.6%) was 51% lower than the smoking rate of those 35 years and older (23.5%). For Hispanics, teens had the highest smoking rate and those in their late twenties had the lowest rates (Figure 5).

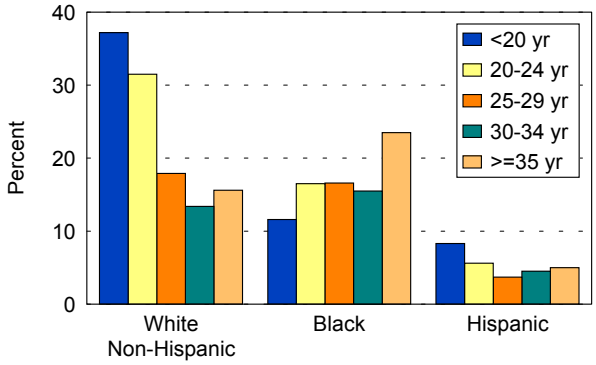


Figure 5. Prevalence of smoking during pregnancy by race/Hispanic origin and age of mother: Indiana, 1999-2000 singleton live births

Recent rise in smoking prevalence among teenagers

Following an 18% decline in prenatal smoking rate among Indiana teenagers (less than 20 years of age) between 1989-1990 and 1995-1996, smoking increased by 7% afterwards (Figure 6). Non-Hispanic white teens had considerably higher smoking rates compared to their black and Hispanic counterparts throughout the 1989 to 2000 period. Between 1989-1990 and 1995-1996, teen smoking rates during pregnancy decreased by 19% among non-Hispanic whites and by 33% among blacks, whereas between 1995-1996 and 1999-2000, their smoking rates increased by 14% and 29%, respectively. Among Hispanic teens, however, the smoking rate declined slightly (by 5%) after 1995-1996 following a sharp decline of 40% in the previous period.

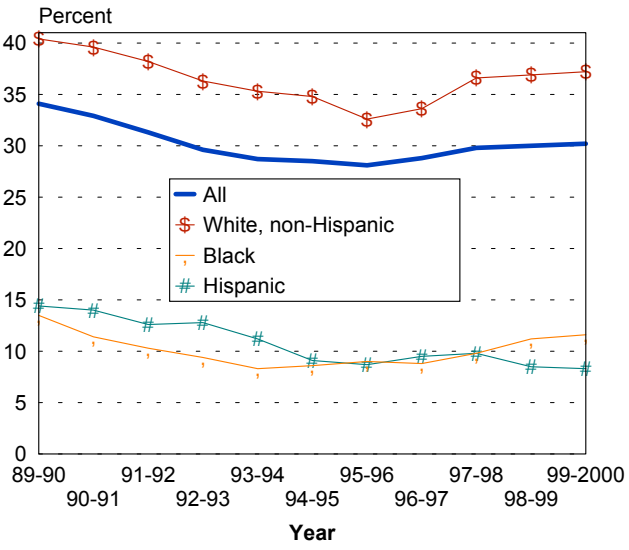


Figure 6. Prevalence of smoking during pregnancy among teen mothers by race/Hispanic origin, Indiana: 1989-2000 singleton live births

(Teen=Less than 20 years of age)

Smoking prevalence decreased as level of education increased

Among both non-Hispanic whites and blacks, smoking rates during pregnancy declined with more years of education. Among Hispanics, however, there was no specific pattern in smoking rate and education of mother (Figure 7). In 1999-2000, almost half of the adult (20 years of age and older) non-Hispanic white and more than one third of the adult black mothers who had not completed high school smoked during pregnancy compared to 8-9% among those who had some college education.

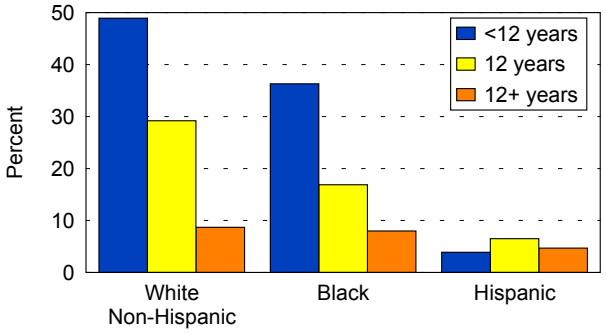


Figure 7. Prevalence of smoking during pregnancy by race/Hispanic origin and education of mother: Indiana: 1999-2000 singleton live births

(Based on mothers 20 years of age and older)

High smoking rates in many Indiana counties

During 1999-2000, prevalence of smoking during pregnancy in Indiana counties ranged from 7.5% to 36.2%. The top five counties with the lowest pregnancy smoking rates were Hamilton (7.5%), LaGrange (11.3%), Hendricks (13.2%), Adams (13.3%), and Tipton (14.0%) counties. The smoking rate in these counties declined significantly by 25-52 percent since 1989-1990. The five counties with the highest prevalence of smoking during pregnancy and no significant change during the past decade were Scott (36.2%), Crawford (35.4%), Perry (33.0%), Jefferson (32.4%), and Decatur (31.6%) counties. Smoking rate was less than 15% in 8 counties and more than 25% in 44 counties. Two-thirds of the counties with very high smoking rates (above 25%) were located in the southern half of the state (Figure 8).

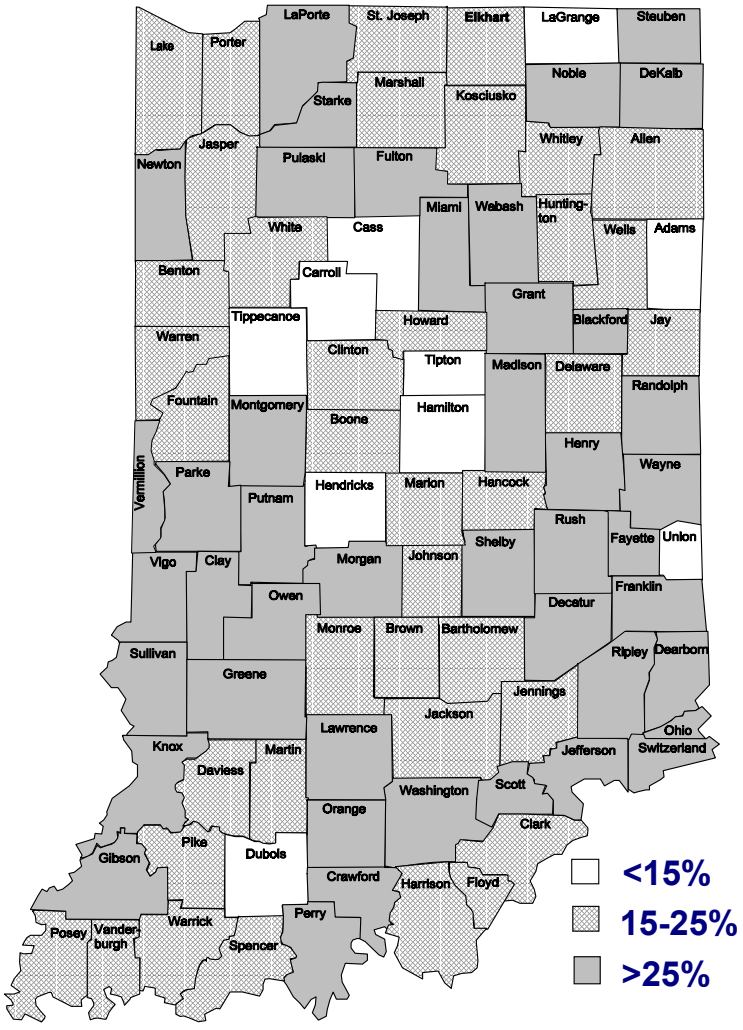


Figure 8. Prevalence of smoking during pregnancy in Indiana counties: 1999-2000 singleton live births

From 1989-1990 to 1999-2000, the pregnancy smoking rate declined significantly in 48 counties. Smoking rate declined by 30-39% in 8 counties (Brown, Carroll, Elkhart, Lake, Porter, St. Joseph, Tippecanoe, and Union) and by 40% or more in 4 counties (Bartholomew, Hamilton, Hendricks, and Tipton). Smoking prevalence increased by more than 10% in 8 counties but the change was statistically significant only in Dearborn County. There was little or no change (less than 10%) in smoking rate in 36 counties, the majority of which had a very high prevalence of smoking in 1999-2000.

Smokers were at higher risk of adverse birth outcomes

Compared to non-smokers in Indiana, mothers who smoked during pregnancy were 2.4 times more likely to have small-for-gestational-age (SGA) births, 2.1 times more likely to have low birth weight infants, and only 1.3 times more likely to have preterm infants (Figure 9). This is in agreement with previous findings that the association of smoking to low birth weight is mainly due to growth retardation and to a lesser extent to preterm birth[3,7,8]. With an overall decline of 23% in maternal smoking rate in Indiana between 1989-1990 and 1999-2000, the prevalence of SGA births during this period remained unchanged (Figure 10). No improvement in the prevalence of SGA births, despite a considerable decline in self-reported smoking rate during pregnancy may partly be due to under-reporting of smoking during pregnancy.

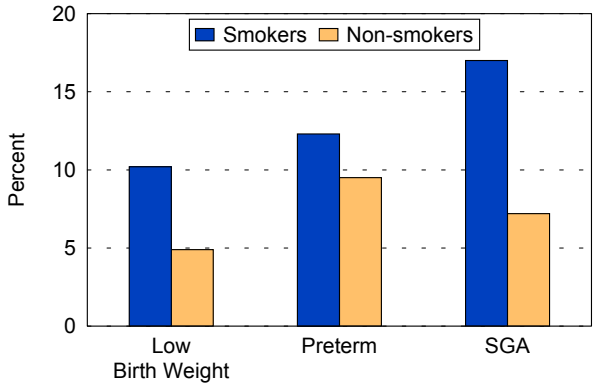


Figure 9. Birth outcome by smoking status during pregnancy: Indiana, 1999-2000 singleton live births.

(SGA=Small-for-Gestational-Age)

Data quality

Smoking rates based on birth certificate data has been shown to underestimate the true rates during pregnancy[10-11]. The questions asked on the birth certificate include a yes or no answer to whether mother smoked during pregnancy and the number of cigarettes smoked. It does not have specific time referents. The information collected may come from the prenatal records, the attending physician, the prenatal care provider, or from the mother herself after delivery, and it can be based on mother's smoking status at any time during pregnancy. A recent study on alternative ways of asking about mother's smoking habits on birth certificates concluded that information on smoking before and during each trimester of pregnancy is needed to give a more accurate picture of smoking during pregnancy[12].

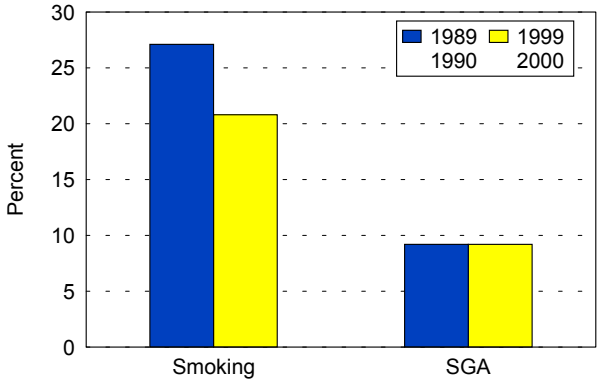


Figure 10. Prevalence of smoking during pregnancy and SGA births: Indiana, 1989-1990 versus 1999-2000 singleton live births

(SGA=Small-for-Gestational-Age)

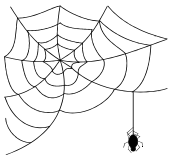
Conclusion

Public health education efforts at national and state levels to reduce overall smoking and the specific focus on informing pregnant women about the negative effects of smoking on birth outcome has helped reduce the smoking rate during pregnancy in Indiana. Despite this progress, Indiana remained one of the top four states for a high pregnancy smoking rate in 1999. The recent rise in prenatal smoking rate among Indiana teens and alarmingly high rates in certain counties indicate the need for extra educational efforts directed towards the specific populations that are at highest risks.

Evidence from previous analyses and from the present study indicates that smoking during pregnancy increases the risk of fetal growth retardation. Despite a 26% decline in pregnancy smoking rate in Indiana between 1989 and 2000, prevalence of SGA births remained unchanged. This may partly be due to increased under-reporting of smoking during pregnancy. The increased publicity on negative effects of smoking during pregnancy over the last decade may have reduced the validity of self-reported smoking prevalence over time. Revising questions on birth certificates regarding tobacco use that are more successful in identifying whether, when, and how much a woman smoked during pregnancy is recommended.

References:

1. Sexton M, Herbel R. A clinical trial of change in maternal smoking and its effect on birth weight. JAMA 1984;251:911-915.
2. Kramer MS. Determinants of low birth weight: methodological assessment and meta-analysis. Bull WHO 1987;65:663-737.
3. Wen SW, Goldenburg RL, Cutter GR, et al. Smoking, maternal age, fetal growth, and gestational age at delivery. Am J Obstet Gynecol 1990;162:53-58.
4. Malloy MH, Kleinman JC, Land GH, Schramm WF. The association of maternal smoking with age and cause of death. Am. J Epidemiol 1988;128:46-55.
5. Mitchell EA, Ford RPK, Stewart AW, Taylor BJ, Becroft DMO, Thompson JMD, et al. Smoking and the sudden infant death syndrome. Pediatrics 1993;91:893-896.
6. Ananth CV, Savitz DA, Luther ER. Maternal cigarette smoking as a risk factor for placental abruption, placental previa, and uterine bleeding in pregnancy. Am J Epidemiol 1996;144:881-889.
7. Kramer MS. Socioeconomic determinants of intrauterine growth retardation. Eur J Clin Nutr 1998;52(S1):S29-S33.
8. Wisborg K, Henriksen TB, Hedegaard M, Secher NJ. Smoking during pregnancy and preterm birth. Br J Obstet Gynaecol 1996;103:800-805.
9. Mathews TJ. Smoking during pregnancy in the 1990's. National vital statistics report; vol 49 no 7. Hyattsville, Maryland: National Center for Health Statistics. 2001.
10. Ebrahim SH, Floyd RL, Merritt RK, et al. Trends in pregnancy-related smoking rates in the United States, 1987-96. JAMA 2000;283:361-366.
11. Dietz PM, Adams MM, Kendrick JS, Mathis MP. Completeness of ascertainment of prenatal smoking using birth certificate and confidential questionnaires: Variations by maternal attributes and infant birth weight. Am J Epidemiol 1998;148:1048-1054.
12. Kharrazi M, Epstein D, Hopkins B, Kreutzer R, Doebbert G, Hiatt R, et al. Evaluation of four maternal smoking questions. Public Health Rep 1999; 113:60-70.



Wonderful Wide Web Sites

ISDH Data Reports Available

The ISDH Epidemiology Resource Center has the following data reports and the Indiana Epidemiology Newsletter available on the ISDH Web Page:

http://www.statehealth.IN.gov (under Data and Statistics)

Indiana Cancer Incidence Report (1990, 95,96)

Indiana Cancer Mortality Report (1990-94, 1992-96)

Indiana Health Behavior Risk Factors (1995-96, 97, 98,99)

Indiana Hospital Consumer Guide (1996)

Indiana Maternal & Child Health Outcomes & Performance Measures (1988-97, 1989-98, 1990-99)

Indiana Mortality Report (1997,98,99, 2000)

Indiana Natality/Induced Termination of Pregnancy/Marriage Report (1998, 1999)

Indiana Natality Report (1995, 96, 97)

Indiana Marriage Report (1995, 96, 97)

Indiana Report of Diseases of Public Health Interest (1996, 97, 98, 99)

HIV Disease Summary

Information as of January 31, 2002 (based on 2000 population of 6,080,485)

HIV - without AIDS to date:

357	New cases from February 2001 thru January 2002	12-month incidence	5.87 cases/100,000
3502	Total HIV-positive, alive & without AIDS on January 31, 2002	Point prevalence	57.60 cases/100,000

AIDS cases to date:

339	New AIDS cases February 2001 thru January 2002	12-month incidence	5.58 cases/100,000
2929	Total AIDS cases alive on January 31, 2002	Point prevalence	48.17 cases/100,000
6465	Total AIDS cases, cumulative (alive and dead)		

REPORTED CASES of selected notifiable diseases

Disease	Cases Reported in January *MMWR* Weeks 1-4	
	2001	2002
Campylobacteriosis	2	2
Chlamydia	1,058	940
Invasive Drug Resistant *S. pneumoniae* (DRSP)	2	6
E. coli O157: H7	0	1
Hepatitis A	0	1
Hepatitis B	0	0
Gonorrhea	480	457
Legionellosis	1	0
Lyme Disease	0	0
Meningococcal, invasive	0	0
Pertussis	0	0
Rocky Mountain Spotted Fever	0	0
Salmonellosis	7	3
Shigellosis	9	3
Syphilis (Primary and Secondary)	6	6
Tuberculosis	10	9
Animal Rabies	0	1

For information on reporting of communicable diseases in Indiana, call the ISDH Communicable Disease Division at (317) 233-7665

Indiana
Epidemiology
Newsletter

The *Indiana Epidemiology Newsletter* is published by the Indiana State Department of Health to provide epidemiologic information to Indiana health professionals and to the public health community.